MATERIAL SAFETY DATA SHEET (MSDS) **UPDATED MAY 1, 2018**

SECTION 1: PRODUCT INFORMATION

Chemical/Trade name (as used on label)	Chemical Family/Classification
Sealed Lead Acid Battery	Electric Storage Battery
Manufacturer's Name	Address
Tempest	1272 Alma Ct.
TEMPEST Safety Department 1-800-727-8658	San Jose, CA 95112

SECTION 2: HAZARD(S) IDENTIFICATION

			Air Exposure Limits (ug/m3)		
Exposure Limits Material	**% By Wt.**	**CAS Number**	**OSH**	**AGGIH**	**NIOSH**
Lead	57	7439-92-1	50	150	100
Lead Oxide	22	1309-60-0	50	150	100
Electrolyte (32% Sulfuric Acid 68% Water)	14	7664-93-9	1	1	1

(Note: Product contains toxic chemicals that are subject to the reporting requirements of Section 302 and 313 of the Emergency Planning and Community Right-To-Know Act of 1986).

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

Material is Solid at normal temperatures.

Electrolyte

Boiling Poing	230oF / 110oC	**Melting Point**	Lead 327.4oC
Specific Gravity	1.215-1.350	**Vaport Density**	Not determined
% Volatiles By Weight	Not Appilicable	**Vapor Pressure**	Not determined
Solubility in Water	100% (electrolyte)	**Evaportation Rate**	Not determined

Appearance and Odor:

Electrolyte is a clear liquid with a acidic odor

SECTION 4: FIRST-AID MEASURES	
Under normal operation conditions, the internal material will not be hazardous to your health. Only internally exposed material during production or case brakage or extreme heat (fire) may be hazardous to your health.	
Routes of Entry	
Installation	Acid mist from formation process may cause respiratory irritation.
Skin Contact	Acid may cause irritation, burns and/or ulceration.
kin Absorption	Not a significant route of entry.
Eye Contact	Acid may cause sever irritation, curns, comea damage and/or blindness
Ingestion	Acid may cause irritaion of mouth, throat, esophagus and stomach.

Sign and Symptoms of Over Exposure:	
Acute Effects	Over exposure to lead may lead to loss of appetite, constipation, sleeplessness and fatigue. Over exposure to acid may lead to skin irritation, corneal damage of the eyes and upper respiratory system.
Chronic Effects	Lead and its components may cause damage to kidneys and nervous system. Acid and its components may cause lung damage and pulmonary conditons.
Potential to Cause Cancer	The International Agency for Research on Cancer has classified "strong inorganic acid mist containing sulfuric acid" **as a Category 1 carcinogen** a substance that is carcinogenic to humans. This classificatin does not apply to liquid forms of sulfuric acid or sulfuric acid solutions contained within a battery. Inorganic acid mist is not generated under normal use of this. Product. Misuse of the product, such as overcharging, may however result in the genration of sulfuric acid mist.

Emergency and First Aid Procedures	
Inhalation	Remove from exposure and apply oxygen if breathing is difficult.
Skin	Wash with plenty of soap and water. Remove any contaminated clothing.
Eyes	Flush with plenty of water immediately for at least 15 minutes. Consult a physician.
Ingestion	Consult a physician immediately.
California Proposition 65	
The State of California has determined that certain battery terminals and related accessories contain l lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm.	
Warning: Wash hands throroughly after handling batteries	

SECTION 5: FIRE-FIRGHTING MEASURES

Flash Point	Hydrogen=259oC
Auto Ignition Temperature	Hydrogen=580oC
Extinguishing Media	Dry Chemical, foam, CO2
Unusual Fire and Explosion Hazards	Hydrogen and oxygen gases are produced in the cells during normal battery operation (hydrogen is flammable and oxygen supports combustion). These gases enter the air through the vent caps. To avoid the chance of a fire or explosion, keep sparks and other sources of ignition away from the battery.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup. Avoid contact with any spilled material. Conatain spill, isolate hazard area, and deny entry. Limit site access to emergency responders. Neutralize with sodium bicarbonate, soda ash, lime or other neutralizing agent. Place battery in suitable container for disposal. Dispose of contaminated material in accorrdance with applicablelocal, state and federalregulations. Sodium bicarbonate, soda ash, sand, lime or other neutralizing agent should be kept on-site for spill remediation.

Personal Precautions: Acid resistant aprons, boots and protective clothing. ANSI approved saftey glasses with side shields/face shield recommended.

Environmental Precautions: Lead and its compounds and sulfuric acid can pose a severe threat to the environment. Contamination of water, soil and air should be prevented.

SECTION 7: HANDLING AND STORAGE

Precautions for safe handling:

Advice on Safe Handling	Handle in accordance with good industrial hygiene and safety practice. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Wash face, hands, and any exposed skin thoroughly after handling. Do not eat, drink or smoke when using this product. Use only outdoors or in a well-verntilated area. Do not breathe dust/fume/gas/mist/vapors/spray. Due to the battery's low internal resistance and high power density, high levels of short circuit current can be developed across the battery terminals. Do not rest tools or cables on the battery. Use insulated tools only. Follow all installation instructions and diagrams when installing or maintaining battery systems.

Conditions for safe storage, including any imcompatibilities:

Storage Conditions	Store batteries in a cool, dry, well ventilated area that are separated from incompatible materials and any activities which may generate flames, sparks, or heat. Keep clear of all metallic articles that could contact the negative and positive terminals on a battery and create a short circuit condition.
Incompatible Materials	Sulfuric acid: Contact with combustibles and organic materials may cause fire and explosion. Also reacts violently with strong reducing agents, metals, sulfur trioxide gas, strong oxidizers, and water. Contact with metals may produce toxic sulfur dioxide fumes and may release flammable hydrogen gas. Lead Compounds: Avoid contact with strong acids, bases, halides, halogenates, potassium nitrate, permangante, peroxides, nascent hydrogen, and reducing agents.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Respiratory Protection:

None required under normal handling conditions. During battery formation (high-rate charge condition), acid mist can be generated which may cause respiratory irritation. Also if acid spillage occurs in a confined space, exposure may occur. If irritation occurs, wear a respirator suitable for protection against acid mist.

Eyes and Face:

Chemical splash goggles are preferred. Also acceptable are "visor-gogs" or a chemical face shield worn over safety glasses.

Hands, Arms, Body:

Vinyl coated, VC gauntiet type gloves with rough finish are preferred.

Other Special Clothing and Equipment:

Safety shoes are recommended when handling batteries. All footwear must meet requirements.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Item		Lead and lead compounds	Electrolyte
Appearance	Form:	Solid	Liquid
	Color:	Grey	Colorless
	Odor:	Odorless	
PH		N/A	
Melting point/freezing point.		327.4*C(melting point)	35 to -60 *C
Initial boiling point and boiling range		1740*C(lit)	Approx. 108-114*C
Flash point		N/A	
Evaporation rate.		N/A	
Vapor pressure. (mm Hg at 20* C		N/A	
Vapor density.(Air=1)		7.1	3.4
Density(20* C)		11.35 g/cm	1.2 to 1.3 g/cm
solubility in water:		3	Fully soluble
Partition coefficient: n-octanol/water.		N/A	
Decomposition temparture.		N/A	

Lead and Lead compounds used in Lead Acid batteries are poorly soluble in water. Lead can be dissolved in acidic or alkaline environment only

SECTION 10: REACTIVITY DATA

Stability	**Stable**
Conditions to Avoid	Sparks and other sources of ignition
Incompatibilty: (materials to avoid)	
1	Lead/lead compounds: Potassiumm carbides, sulfides, peroxides phosphorus, sulfur.
2	Battery electrolyte (acid): Combustible materials, strong reducing agents most metals, carbides, organic materials, chlorates, nitrates, picrates, and fulminates.
Hazardous Decomposition Products:	
1	Lead/lead compounds: Oxides of lead and sulfur
2	Battery electrolyte (acid): Hydrogen, sulfur dioxide, and sulfur trioxide.
Conditions to Avoid:	

High temperature. Battery electrolye (acid) will react with water to produce heat. Can react with oxidizing or reducing agents.

SECTION 11: TOXICOLOGGICAL INFORMATION

Information on likely routes of exposure:

Product Information

Eye Contact	Causes severe eye damage
Skin Contacat	Causes severe skin burns
Inhalation	Harmful by inhalation
Ingestion	Harmful if swallowed

Component information:

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50
Sulfuric Acid 7664-93-9	*2140mg/kg (Rat)	*	510 mgm* (Rat) 2h
Tin 7440-31-5	*700 mg/kg (Rat)	*	*

Information on physical, chemical and toxicological effects:

Symptoms	Please see section 4 of this SDS for symptoms.

Delayed and immediate effects as well as chronic effects from short and long-term exposure:

Carcinogenicity

The table below indicates whether each agency has listed any ingredient as a carcinogen. However, the product as a whole has not been tested. IARC has classified "strong inorganic acid mist containing sulfuric acid" as a category 1 carcinogen, sustance that is carcinogenic to humans. This classification doe not apply to liquid forms of sulfuric acid or sulfuric acid solutions contained within a battery. Inorganic acid mist is not generated under normal use of this product. Misuse of the product, such as overcharging, may result in the generation of sulfuric acid mist. Hazardous exposure to lead can occu only when product is heated, oxidized, or otherwise processed or damaged to create dust, vapor or fume.

Chemical Name	ACGIH	IARC	NTP	OSHA
Lead 7439-92-1	A3	Group 2A	Reasonably Ant	X
Sulfuric Acid 7664-93-9	A2	Group 1	Known	X

Legend

ACGIH (American Conference of Governmental Industrial Hygienists)

A2- Suspected Human Carniogen

A3- Animal Carcinogen

IARC (International Agency For Research On Cancer)

Group 1- Carcinogenic to Humans

Group 2A- Probably Carcinogenic to Humans

NTP (NATIONAL Toxicology Program)

Known- Known Carcinogen

Reasonalby Anticipated- reasonably Anticipated to be a human Carinogen

OSHA (Occupational Safety and Health Administration of the US Department of Labor)

X-Present. Reproductive toxicity: May damage feritlity or the unborn child. STOT- repeated exposure

Causes damage to organs through prolonged or reated exposure. Numerical measures of toxicity: Not determined.

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity:

Very toxic to aquatic life with long lasting effects.

Chemical Name	Algae/aquatic plants	Crustacea	Toxicity to microorganisms
Lead 7439-92-1		600: 48h water flea pgL EC50	
Sulfuric Acid 7664-93-9		29: 24 h Daphnia magna mgLEC50	

Fish
0.44: 96 h Cyprinus carpio mg/L LC50 semi-static 1.17: 96h Oncothynchus mykiss mg/L LC50 flow-through 1.32: 96h Oncorthynchus mykiss mg/L LC50 static
500: 96h Brachydanio rerio mg/L LC50 static

Persistence/Degradability

Not determined

Bloaccumulation

Not determined

Mobility

Not determined

SECTION 13: DISPOSAL CONSIDERATIONS

Waste Treatmen Methods

Disposal of Wastes	Spent Batteries - send to secondary lead smelter for recyling. Follow applicable federal, state and local regulations. Neutralize as in preceding step. Collect neutralized materil insealed container and handle as hazardous waste as applicable. A copy of this SDS must besupplied to any scrap dealer or secondary lead smelter with the
Contaminated Packaging	Battery. Disposal should be in accordance with applicable regional, national and local laws andregulations.

Chemical Name	RCRA	RCRA U Series	RCRA D Series	RCRA- Basis for Listing
Lead 7439-92-1			5.0 mg/L regulatory level	Included in waste streams: F035, F037, F038, F039, K002, K003, K005,K046, K048, K051, K052, K061, K062, K069, K086, K100 K176, K049

Chemical Name	California Hazardous Waste Status
Lead: 7439-92-1	Toxic
Sulfuric Acid: 7664-93-9	Corrosive

SECTION 14: TRANSPORTATION INFORMATION

SHIPPING REGULATIONS

Proper Shipping Name	Batteries, Non-Spillable, Electric Storage
U.S. DOT (US Department of Transportion) **IATA (International Air Transportation Civil Aviation Administration)**	Unregulated, meets the requirement of 49 CFR 173.159(d)
IMO (International Maritime Dangerous Goods)	Unregulated

Comments:

TEMPEST sealed lead-acid batteries are classified as "non-spillable" for the purpose of transportation by DOT, and IATA/ICAO Test described in DOT(49 CFR 173.159(d)as result of passing the Vibration and Provision A67).

Pressure Differential Test described in DOT(49 CFR 173.159(d) and IATA/ICAO (Special TEMPEST seal lead-acid batteries can be safely transported on deck, or under deck stored on either cargo vessel as result of passing the Vibration and Pressure Differential Tests as described in the regulations.

SECTION 15: REGULATORY INFORMATION

International Inventories

Chemical Name	TSCA	DSL	NDSL	EINECS	ELINCS	IECSC	KECL	PICCS/AICS
Lead	Present	X		Present	Present	X	Present	X
Sulfuric Acid	Present	X		Present	Present	X	Present	X
Tin	Present	X		Present		X	Present	X
Calcium	Present	X		Present		X	Present	X

Legend

TSCA	United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL	Canadian Domestic SubstancesList/Non-Domestic Substance List
EINECS/ELINCS	European Inventory of Existing Chemical Substances/ European List of Notified Chemical Substances
ENCS	Japan Existing and New Chemical Substances
IECSC	China Inventory of Existing Chemical Substances
KECL	Korean Existing and Evaluated
PICCS	Phillipines Inventory of Chemicals and Chemicals Substances
AUCS	Australian Inventory of Chemical Substances

US Federal Regulations

CERCLA

Chemical Name	Hazardous Substances RQs	CERCLA/SARA RQ	Reportable Quantity
Lead 7439-92-1	10 lb		RQ 10 lb final RQ, RQ 4.54 kg
Sulfuric Acid 7664-93-9	1000 lb	1000 lb	RQ 1000 LB final RQ, RQ 454 kg

SARA 313 Final RQ 4.54, RQ 454 kg

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

Chemical Name	CAS No	Weight %	SARA 313- Threshold Values %
Lead- 7439-92-1	7439-92-1	65-75	0.1
Sulfuric Acid-7664-93-9	7664-93-9	14-20	1

CWA (Clean Water Act)

Chemical Nar	CWA- Reportable Quantitie	CWA- Toxic Pollutants	CWA- Priority Pollutants	CWA Hazardous Substances
Lead		X	X	
Sulfuric Acid	1000 lb			X

US State Regulations

California Proposition 65

This product contains the following Proposition 65 chemicals

Chemical Name	California Proposition 65
Lead-7439-92-1	Carcinogen Developmental Femal Reproductive Male Reproductive
Sulfric Acid - 7664-93-9	Carcinogen

U.S. State Right-to-Know Regulations

Chemical Name	New Jersey	Massachusetts	Pennsylvania
Lead 7439-92-1	X	X	X
Sulfuric Acid 7664-93-9	X	X	X
Tin 7440-31-5	X	X	X
Calcium 7440-70-2	X	X	X

DISCLAIMER

The information privided in this Safety Data Sheet is correct ot the best of our knowledge. Information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information materials or in any process, ulless specified in the text.